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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/913,462	08/15/2001	Stephen Minnis		2421

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EXAMINER	
LERNER, MARTIN	
ART UNIT	PAPER NUMBER
2654	

DATE MAILED: 11/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/913,462	MINNIS, STEPHEN	
	Examiner	Art Unit	
	Martin Lerner	2654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 to 10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 to 10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☒ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *05 December 2001*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of Applicant's claim for foreign priority based on Application No. 99305349.5 filed in the United Kingdom on 07/06/1999. It is noted, however, that Applicant has not filed a certified copy of the Application as required by 35 U.S.C. 119(b). Certification is established for Application No. 9905904.0 filed in the United Kingdom on 03/15/1999 and for PCT/GB00/00854 filed on 03/08/2000, but not for Application No. 99305349.5 filed on 07/06/1999.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested:

Speech Synthesis with Prosodic Boundary Information

3. The disclosure is objected to because of the following informalities:

The Specification does not contain section headings. It is conventional under patent practice in the United States to include section headings, i.e. Background of the Invention, Summary of the Invention, Brief Description of the Drawings, and Detailed Description of the Preferred Embodiments.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 7, line 5, "said store" is indefinite between "said program store" and "a word sequence store".

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

7. Claims 1 and 6 to 10 are rejected under 35 U.S.C. 102(a) as being anticipated by *Huang et al. (EP '304)*.

Regarding independent claims 1, 7, and 8, *Huang et al. (EP '304)* discloses a method and apparatus for text to speech conversion, comprising:

"a word sequence store storing a plurality of reference word sequences which are provided with prosodic boundary information" – TTS facility 28 includes one or more prosodic databases (Page 3, Lines 53 to 57: Figure 1); a prosodic database is built

Figure 2: Step 30); natural language processing (NLP) is performed on each sentence (i.e. text analysis 56 is performed) and information is used to predict tonal markings (step 76 in Figure 4) ; much of human prosodic patterns of speech can be captured by predicting tonal markings; an entry is created in a prosodic database to hold an index of an associated tonal marking string ("prosodic boundary information") for the sentence (step 78 in Figure 4) (Page 3, Lines 20 to 38; Page 4, Line 10 to Page 5, Line 17: Figure 5);

"a program store storing a program" – memory 20 holds a copy of a text-to-speech facility (Page 3, Lines 47 to 52: Figure 1);

"a processor in communication with said program store and said store" – computer 10 includes a central processing unit (CPU) 12 (Page 3, Lines 47 to 52: Figure 1);

"means for receiving an input word sequence in the form of text" – after a prosodic database has been built, the first step in the speech synthesis is to identify the speech that is to be generated (step 32 in Figure 2); this speech is a chunk of text that represents a sentence (Page 5, Lines 18 to 22: Figure 2);

"wherein said program is executable to control said processor to: compare said input word sequence with each one of a plurality of said reference word sequences" – input text is parsed and predicted tonal markings are generated for an input sentence (step 34 in Figure 2); given the predicted tonal markings, the prosodic template 60 in the prosodic database may be accessed using the predicted tonal markings as an index (step 36 in Figure 2); it is determined whether there is a match (i.e. an entry that is

indexed by the same tonal marking pattern as that that is predicted for the input sentence (step 38 in Figure 2) (Page 5, Lines 22 to 31: Figure 2); determining whether there is a match involves a step to "compare said input word sequence" with prosodic templates 60 in the prosodic database;

"identify one or more reference word sequences which most closely match said input word sequence" – if there is a matching entry, it is used to establish the prosody for the synthesized speech for the input sentence (step 40 in Figure 2); if an exact match is not found in step 38 of Figure 2, the best-matching entry in the prosodic database is determined (Page 5, Lines 32 to 44: Figure 2);

"derive prosodic boundary information for the input text on the basis of the prosodic boundary information included with said one or more most closely matching reference word sequences" – the fundamental frequencies from the prosodic database are employed to establish a prosody of the synthesized speech output (Page 5, Lines 39 to 44: Figure 2: Step 44); fundamental frequencies are determined by tonal markings ("prosodic boundary information").

Regarding claim 6, *Huang et al. (EP '304)* discloses a comparison is made by matching predicted tonal markings of an input sentence with an entry for indexed tonal markings of a prosodic template in the prosodic database (Page 5, Lines 29 to 31: Figure 2: Step 38); tonal markings represent "prosodic boundaries".

Regarding claims 9 and 10, *Huang et al. (EP '304)* discloses TTS facility 28 holds the instructions for practicing the invention of determining prosody applied to input text (Page 3, Lines 49 to 50: Figure 1).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 2 to 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Huang et al. (EP '304)* in view of *Hirschberg ('262)*.

Concerning claim 2, *Huang et al. (EP '304)* is directed to identifying prosody for a sentence by syllables and individual words, and does not expressly disclose identifying clusters of words in the input text which are unlikely to include prosodic phrase boundaries. However, *Hirschberg ('262)* teaches a text-to-speech system with automatically trained phrasing rules, where a phrasing module 122 receives an input of records 128 and outputs a new linked list of record structures146 containing additional data including an intonational boundary assigned by the phrasing module 122. The phrasing module determines, for each potential intonational phrase boundary site (i.e., position between two real words), whether or not to assign an intonational phrase boundary at that site. (Column 4, Line 65 to Column 5, Line 6: Figure 1) A set of predetermined text 105 is annotated by symbols "|", designated by reference numerals 190, to denote a "predicted intonational boundary". (Column 7, Lines 26 to 30: Figure 3) Thus, predicted intonational boundaries are denoted by a symbol "|", and correspondingly, words between symbols "|" "are unlikely to include prosodic phrase

boundaries". *Hirschberg ('262)* suggests a method of training a TTS system to assign intonational features to generate a statistical representation, which may then be used to generate synthesized speech from new sets of input text. Stated advantages are improving speed of training, increasing adaptability to different dialects and applications, and achieving high accuracy. (Column 3, Lines 21 to 47) Then, *Huang et al. (EP '304)* performs comparisons for each syllable of a sentence in the prosodic database for prosodic templates and predicted tonal markings ("a plurality of per-cluster comparisons"). It would have been obvious to one having ordinary skill in the art to utilize the method of annotated symbols for predicted intonational boundaries as taught by *Hirschberg ('262)* to identify clusters of words in an input sentence that are unlikely to include prosodic phrase boundaries in the speech synthesis method with prosodic databases of *Huang et al. (EP '304)* for the purpose of improving speed of training, increasing adaptability to different dialects and applications, and achieving high accuracy.

Concerning claims 3 and 4, *Hirschberg ('262)* teaches a determination of intonational phrase boundaries is based upon a vector 148 comprising a set of variable values 150 corresponding to answers to questions (1) to (20) (column 5, lines 6 to 65); queries relating to a syntactical constituent structure of the input text focus on the relationship of the potential intonational phrase boundary to the syntactic constituents of the current sentence (e.g. does the potential intonational phrase boundary occur between a noun phrase and a verb phrase?) (column 6, lines 14 to 32); thus, at least questions (3) to (6) relate to "syntactical characteristics" and the set of variable values

150 are "quantifying the degree of similarity" between elements of a sentence; *Hirschberg ('262)* discloses questions relating to syntactical characteristics of words w_i, w_j in each cluster (e.g. questions (3) to (6)), and questions relating to syntactical characteristics of entire clusters (e.g. questions (10) to (13)).

Concerning claim 5, *Hirschberg ('262)* discloses questions relating to the number of words in each cluster (e.g. questions (7) to (9) and (12)).

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

Nukaga et al., Corrigan et al., Huang et al. ('193), Silverman ('117), and Huang et al. ("Whistler: a trainable text-to-speech system") disclose related art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin Lerner whose telephone number is (703) 308-9064. The examiner can normally be reached on 8:30 AM to 6:00 PM Monday to Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (703) 305-9645. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ML
10/28/04

Martin Lerner
Examiner
Group Art Unit 2654